

### **Remarks/Arguments**

The present amendment is made in response to the Office Action dated October 1, 2004, and identified as Paper No. 20040923. Claims 1-7 are pending in the application.

In the Action, the Examiner objected to the specification as claiming priority to a provisional application filed by difference inventors. Applicant has amended the specification to claim priority to both U.S. Provisional Application No. 60/400,359 filed on July 31, 2002, and U.S. Provisional Application No. 60/400,357 filed on July 31, 2002.

In the Action, the Examiner repeated the rejection of claim 1 under 35 U.S.C. § 103(a) as obvious over a 2001 article by Carney et al. ("*Carney*") in view of U.S. Patent No. 5,724,485 to Rainton ("*Rainton*"). Claim 2 was again rejected under 35 U.S.C. § 103(a) as obvious over *Carney*, in view of *Rainton*, in further view of U.S. Patent No. 6,031,862 to Fullerton et al. ("*Fullerton*"). Claims 3 and 4 were again rejected under 35 U.S.C. § 103(a) as obvious over *Carney*, *Rainton*, *Fullerton*, in further view of U.S. Patent No. 5,757,641 to Minto ("*Minto*"). Claims 5-7 were again rejected under 35 U.S.C. § 103(a) as obvious over *Carney*, *Rainton*, *Fullerton*, and *Minto*, in further view of U.S. Patent No. 4,363,138 to Franklin et al. ("*Franklin*").

In response to a prior Office Action, Applicant argued that the Examiner's proposed combination of *Rainton* with *Carney* to reject all of the claims was improper because there was no motivation or suggestion in the prior art to take the cross-correlator of *Rainton* and combine it with the two filters of *Carney*. According to the Examiner, the motivation to modify *Carney* according to *Rainton* is that *Rainton* suggests using a cross-correlator to adjust the coefficients of the filters to minimize the discriminant function – which is the same reason the cross-correlator is used in the present invention. Although Applicant pointed out that *Rainton* requires the use of

an adaptive controller in combination with the cross-correlator, the Examiner maintained that the motivation still applied because the Applicant's claims were "open," *i.e.*, they used the term "comprising."

Applicant respectfully submits that the Examiner has misinterpreted the prior art and the present invention. *Rainton* generally discloses a cross-correlator that is used to adaptively change the filter coefficients of two finite impulse response filters so that the transfer functions of the filters are changed. The cross-correlator outputs a comparison of the delay between the two signals, and an adaptive controller decides how to adjust the filters based on the cross-correlation results based on a discriminant function (a discriminant function is simply a measurement of how much the output of the cross-correlator varies from a given parameter). *Rainton*, col. 8, lines 33-59. *Rainton* further teaches that changing the transfer functions of the filters according to the discriminant function (*i.e.*, changing the way that the filters mathematically condition the input signal to form the output signal) will improve the ability of a system to determine the time delay between two signals applied to the two changeable filters, respectively, in the presence of non-Gaussian noise.

When actually used, the system of *Rainton* must first be "trained" by selectively switching the cross-correlator output to the adaptive controller, applying two sounds emanating from two known locations, and adapting the filters according to the output of the cross-correlator and a true delay ( $T_{true}$ ) based on the known locations of the sound sources. Once the filters are adapted, the cross-correlator is disconnected from the adaptive controller and used exclusively to calculate the delay between two signals. *Rainton*, col. 8, lines 33-59. Thus, the system of *Rainton* doesn't actually use the cross-correlator output to calculate the discriminant function and

adapt the filter *when in use*, but simply to adjust the filters in a “training” mode *before* being used.

The system of *Rainton*, and the use of the cross-correlator, therefore differ from the claimed invention in several regards. First, the present invention does not calculate a discriminant function as asserted by the Examiner. This misunderstanding is critical as it is the basis for the Examiner’s finding that *Rainton* motivates the necessary modifications to *Carney*. Instead, the present invention uses a cross-correlator to calculate the *phase shift* between the transfer functions of two filters that are specifically positioned 180 degrees out of phase from each other and centered at a single target frequency. The filter outputs are never compared to a predetermined value to calculate a discriminant function, nor is a discriminant function of any value to the present application as it would disrupt the operation of the present invention. Thus, any motivation in *Rainton* that a cross-correlator may be used to calculate a discriminant function has absolutely no expectation of success in the present invention and therefore would not motivate one of ordinary skill to make the claimed combination. MPEP § 2143.02 (requiring reasonable expectation of success).

Second, the present invention is not concerned with measuring the time delay between two signals. Instead, the present invention measures the phase shift of the transfer functions of two filters that both receive the same signal to identify the presence of a target frequency within that single signal. Thus, the information that is being cross-correlated in the present invention is *significantly different* from the information being cross-correlated in *Rainton*. Since a “cross-correlator” is essentially a mathematical equation designed to perform a specific function, the “cross-correlator” used in *Rainton* is actually completely different than the “cross-correlator” disclosed and claimed in the present application. Thus, although *Rainton* uses the term “cross-

correlator,” the reference does not actually disclose the “running cross-correlator” that is disclosed and claimed in the present invention. MPEP § 2143.03 (All Claim Limitations Must Be Taught or Suggested).

Third, the cross-correlator of *Rainton* mathematically compares the filter outputs of two filters that receive two separate and different signals. *Rainton*, Abstract (“first receiving section receives a signal . . . second receiving section received a further signal). The present invention, however, simultaneously applies a *single* signal to two filters to identify the presence of a frequency within that single signal. Indeed, *Rainton requires the use of two separate signals*, and therefore teaches away from the present invention. See MPEP § 2143.01. As a result, one of ordinary skill in the art would not be motivated to modify Carney because he or she would not expect that cross-correlating two signal using a discriminant function to adjust filter coefficients of two filters receiving two signals would be of any benefit to cross-correlating static filters applied to a single signal.

Fourth, *Rainton* uses the cross-correlator to calculate a discriminant function for “tuning” the coefficients of a filter having *adaptable* filter coefficients. *Rainton*, col. 4, lines 57-68 (explaining “training mode”). The filters of the present invention as now recited in the claims have a *static* transfer function, however, as the filters must remain centered on the two 180° opposing frequencies for the present invention to work properly. Accordingly, the modifying *Carney* according to *Rainton* would destroy the operability of the claimed invention. See MPEP § 2143.01. Notably, the destruction of the operability of the reference is further evidence that the claimed invention does not use the same type of cross-correlator for the same purpose as *Rainton*.

Finally, and most importantly, *Rainton* states that “the adaptive cross correlator apparatus 100 of the present preferred embodiment is *unable to separate a signal and noise which have arrived from the same spatial location.*” *Rainton*, col. 6, lines 62-65 (emphasis added). The present invention is designed to do exactly that. As a result, any modification based on *Rainton* to do otherwise is specifically contrary to the express purpose of *Rainton* and would additionally render the present invention useless for its principal purpose. See MPEP § 2143.01.

Claim 1 has been amended to clarify these distinctions between the claimed invention and the teaching of *Carney* and *Rainton*. More specifically, claim 1 has been amended to clarify that the filters process the same signal, and that the filters are static, and therefore not adaptable according to a discriminant function as taught by *Rainton*. Claim 5 has also been amended to clarify these distinctions. In light of these amendments, *Rainton* simply cannot motivate the modifications that the Examiner has proposed to *Carney* because it is directed at a completely different result using different structure for different purposes. As a result, the rejections of the claims under 35 U.S.C. § 103 in light of *Rainton* and *Carney* must be withdrawn.

With regard to claim 2, the Examiner proposes that his combination of *Carney* and *Rainton* should be modified according to *Fullerton* because *Fullerton* motivates the use of a low pass filter having an integration time inversely proportional to the integration time of the cross-correlator “in order to detect the received signal in a communication device.” *Fullerton* does not in fact disclose a low pass filter having an integration time inversely proportional to the integration time of the cross-correlator. The portion of the specification relied on by the Examiner does not describe the low pass filter that is connected to the correlator (which is not a “cross-correlator” as claimed in the present application). *Fullerton* used the low pass filter to generate an error signal, which is of no use in the present invention. See *Fullerton*, col. 17, lines

52-57. Thus, Fullerton does not disclose the structure that is relied on by the Examiner and, when combined with Carney, will not include each and every element of the claimed invention. Moreover, there is no motivation or suggestion to make the proposed combination because *Fullerton* does not disclose that one of ordinary skill should use a low pass filter having an integration time inversely proportional to the integration time of the cross-correlator.

With regard to claims 3 and 4, *Minto* does disclose using a signum function to receive the local channel residual error. This “motivation,” however, has nothing to do with the claimed invention because the present invention does not consider or address local channel error (there is none). *Minto* therefore does not motivate using a signum function in combination with first and second filter outputs that are being cross-correlated, as currently claimed in the present application. As explained by the court in *In re Kotzab*, 217 F.3d 1365, 1369-70 (Fed. Cir. 2000):

Most if not all inventions arise from a combination of old elements. Thus, every element of a claimed invention may often be found in the prior art. However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. Rather, to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the ***desirability of making the specific combination*** that was made by the applicant. (internal citations omitted) (emphasis added)

As the Examiner did not identify a suggestion in *Minto* to modify the cited references to make the ***specific combination*** claimed by Applicant, the obviousness rejection is improper. The disclosure that a signum function can receive local channel error simply does not suggest using a signum function to condition filter outputs that are cross-correlated to identify a target frequency, because local channel error is nonexistent (and therefore of no consequence) in the claimed invention. While any motivation may be sufficient to support the proposed combination, the

motivation relied on must have some expectation of success in the claimed invention. MPEP § 2143.02 (requiring reasonable expectation of success).

With regard to claim 5, the Examiner relies on *Franklin* to motivate the use of a threshold detector to determine when the low pass filtered output of the running cross-correlation of the two filters drops *below* a threshold “to minimize false alarm probabilities.” As an initial matter, *Franklin* does not in fact disclose a cross-correlator as “correlator 28” only receives one signal. *Franklin* thus cannot motivate the use of a threshold for detecting the output of a cross-correlator, when the reference lacks such a cross-correlator.

More importantly, the threshold detector of *Fullerton* registers the presence of a signal when a threshold is *exceeded*. Thus, *Franklin* actually teaches away from a threshold detector that signals the presence of a tone when the output is *below* the threshold. There is no basis for the Examiner’s statement that it is known in the art that a target frequency will have a lower value after cross-correlation. Indeed, correlations to identify a target frequency in the presence of noise are typically determined based the output of correlator having a higher output as the degree of correlation between a filtered signal and the target frequency will increase when the filtered signal is in fact the target frequency.

In view of the foregoing, the Examiner’s reconsideration and allowance of the claims of the present application is believed to be in order. If the Examiner believes a phone conference with Applicant’s attorney would expedite prosecution of this application, please contact the undersigned at (315) 218-8515.

Respectfully submitted,

Dated: December 9, 2005

By: 

Reply to Office Action dated September 9, 2005  
Application Serial No. 10/631,131  
RCE and Submission December 9, 2005

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